A collection of sea snakes from Thailand with new records of *Hydrophis belcheri* (Gray)

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SYNOPSIS. A report is given on a collection of sea snakes made, between 1979–1986, by fishermen at various localities around the coasts of Thailand. The commonest species, at many sites, were *Lapemis hardwickii* and *Hydrophis cyanocinctus*.

A poorly known sea snake, *Hydrophis belcheri*, is recorded from Thailand for the first time and the larger sample size allows for variation in the meristic characters of this species to be better assessed. Another new record for Thailand is *Hydrophis fasciatus fasciatus* however the occurrence of this subspecies on the west coast has long been anticipated.

One specimen (*Hydrophis* sp.) proved especially difficult to identify, it is provisionally regarded as being close to *H. lapemoides*.

Some common Thai species, such as *Hydrophis brooki* and *H. torquatus* were not collected; the possible reasons for these intriguing absences are discussed.

INTRODUCTION

The waters of Thailand have an extremely diverse sea snake fauna being adjacent to areas traditionally regarded as a "centre of distribution" of the group (Voris, 1977; Vitt, 1987: 347). The west coast of Thailand is close to the Straits of Malacca (where at least 27 species of sea snake are known to co-exist) and the east coast borders the Gulf of Siam (from where around 16 species have been recorded). The region, by virtue of its central position, is particularly prone to new range extension records for sea snakes (e.g. Frith, 1977; Rasmussen, 1987). However, problems of identification are inclined to cloud the picture when it comes to drawing-up a faunal list for the area, particularly in relation to the difficult genus *Hydrophis* e.g. Suvatti (1950) recorded a surprisingly large number of species but as Tu (1974): 207) observed, 'the names used by Suvatti may not be accurate'.

In an extensive investigation in the Gulf of Thailand (Tu, 1974) where 14 282 sea snakes were collected, *Lapemis hardwickii* was found to be by far the most common species (accounting for some 81% of the sea snakes caught). Among the remaining species there were clearly some problems with

identification (3.4% of the specimens were not identified) and Tu (1974: 203) commented that most of the unidentified snakes belonged to the genus *Hydrophis*. Recently Steubing & Voris (1990) noted marked similarities between marine snake collections made in the Gulf of Thailand and those from the coast of Sabah, Malaysia.

MATERIALS AND METHODS

Between the years 1979 and 1986 one of us (D.W.) was resident in Thailand, and requested fishermen from various settlements around the Gulf and along the west coast to preserve any sea snakes that they encountered in the course of their fishing trips. Unfortunately, this meant that precise locality data are lacking, but as the pattern of fishing dictated that boats left and returned to port on the same day the distances covered were never great. Two hundred and eighty-eight specimens in all were obtained; the material is preserved in the British Museum (Natural History). A list of species is given in Table 1 and the Appendix.

By far the commonest species, found at many of the

Table 1. Sca snakes recorded from Thailand

Laticanda colubrina	1, 2, 5, 7a
L. laticaudata	1, 2, 4, 5?, 8c
L. semifasciata	4
Aipysurus eydouxii	1, 2, 3, 5, 6, 9
Emydocephalus ijimae	4
Acalyptophis peronii	2, 5, 6
Astrotia stokesi	2, 4, 5
Enhydrina schistosa	1, 2, 3, 4, 5, 6, 9
Hydrophis belcheri	9
Hydrophis brookii	1, 2, 3, 5, 6
H. caerulescens	1, 2, 3, 5, 9
H. cyanocinctus	1, 2, 3, 4, 5, 6, 9
H. elegans	5
H. fasciatus	1, 2, 5, 9
H. f. atriceps	1, 3, 9
H. gracilis	1, 4, 5, 6
H. g. microcephalus	1
H. klossi	1, 2, 3, 5, 6, 9
H. lamberti	1, 8b, 9
H. lapemoides	8a, 9
H. mamillaris	1, 5?
H. melanocephalus	4
H. nigrocinctus	1
H. ornatus	1, 2, 3, 4, 5, 6, 9
H. spiralis	4, 5?, 7b, 9
H. torquatus	2
H. t. aagaardii	1
H. t. diadema	1, 2, 3, 6
H. sp. (?nr. lapemoides)	9
Kerilia jerdonii	1, 2, 3, 4, 5
K. j. siamensis	1, 2, 6
Kolpophis annandalei	1, 2, 5
Lapemis hardwickii	1, 2, 3, 4, 5, 6, 9
Lapemis curtus	4
Pelamis platurus	1, 2, 3, 4, 5, 6, 9
Praescutata viperina	1, 2, 3, 4, 5, 6, 8c, 9
Thalassophis anomalus	1?, 3, 6

- 1. Suvatti (1950)
- 2. Taylor (1965)
- 3. Barme (1968)
- 4. Tu & Tu (1970)
- 5. U.S. Navy (1965)
- 6. Tu (1974)
- 7(a) Frith (1974 (b) Frith (1977)
- 8(a) Rasmussen (1987) (b) Rasmussen (1989a) (c) Rasmussen (1989b).
- 9. Present collection (Warrell, this paper)

localitics, was *Lapemis hardwickii* (accounted for over 42% of the sea snakes preserved). Next most common was *Hydrophis cyanocinctus* (27% of the catch). A most notable feature is the presence of *Hydrophis belcheri*; apparently this constitutes the first record of this species from Thai waters.

SYSTEMATIC ACCOUNT

This account deals only with the most noteworthy species in the collections.

Hydrophis belcheri (Gray, 1849)

INTRODUCTION. The name *Hydrophis belcheri* has had a rather confused history leading to a redefinition by McDowell (1972). Confusion stems partly from the influential work of

Smith (1926) whose concept of *H. belcheri* is now recognised as being too broad. In fact *H. belcheri* (sensu Smith) is apparently a composite of at least four species:

(1) H. belcheri (sens. strict.) which is discussed below.

(2) *H.* (*Leioselasma*) *melanocephalus* a species recognised by Smith but thought by him to be restricted 'to the Riu Kius and the coast of Formosa'.

(3) H. (Leioselasma) pacificus regarded as a synonym of belcheri by Smith but recognised as distinct by Cogger (1975). (4) H. (Leioselasma) coggeri which Kharin (1984) described to accommodate Australian examples that had previously been assigned to melanocephalus by McDowell (1972) and Cogger (1975). This is probably the correct name of the 'most venomous snake' cited in McFarlan 1989 (The Guinness Book of Records 1990) as 'Hydrophis belcheri'. The Guinness Book does not provide a reference, but it is almost certainly based on the work of Tamiya & Puffer (1974), who described the lethality of several sea snake venoms including 'H. belcheri from Ashmore Reef', the most toxic of all. However, Tamiya (1975) and Cogger (1975) equivocally regarded Ashmore Reef belcheri as melanocephalus indicating that its taxonomic status was still under review.

In its strict sense, *H. belcheri* is apparently known only from a few individuals. The type of *H. belcheri* is allegedly from New Guinea, while McDowell (1972) records another example from the Java Sea; two further specimens were collected during a fisheries survey of the Java Sea in 1976 and are now preserved in British Museum (Natural History). Apparently, nothing further has been recorded, to add to the known range of *H. belcheri*, which makes the occurrence of 14 specimens, reported here, from various localities in the Gulf of Thailand, all the more remarkable. Such a significant increase in the available sample of *H. belcheri* makes it worthwhile re-examining the diagnostic characteristics of the species and evaluating the variation found.

MATERIAL (Fig. 1). Holotype: BMNH 1946.1.1.97 (formerly 42.11.22.30) 'New Guinea'. Java Sea: AMNH 63947 off Karima Djava Island (reported by McDowell 1972). BMNH 1977.125 Off S. Coast of Kalimantan. BMNH 1977.126 06°28′ S: 110°30′ E Gulf of Thailand: BMNH 1987.42–49 Tachalab, near

Chanthaburi; BMNH 1987.50–53 Samut Sakhon; BMNH 1987.54 Pattani; BMNH 1987.55 Nakon Si Thammarat.

DESCRIPTION. Scalation: Scale rows on neck 24–26, scale rows at midbody 32–36. Body scales are imbricate and somewhat variable in shape, some are hexagonal others (particularly on the posterior part of the body) are more rounded. Ventrals are more than twice as broad as adjacent costals and range in numbers from 278 to 313. There are 28 to 42 subcaudals. Supralabials usually seven (rarely six or eight) normally only a single supralabial (the fourth) borders the eye but, rarely, two border the eye (third and fourth or fourth and fifth). Infralabials eight or nine (rarely ten), no cuneate scales. Preoculars one, postoculars normally two (occasionally one or three), anterior temporals usually two (sometimes onc).

Coloration: Head usually black with flecks of olive and, fairly frequently, at least traces of a yellowish horse-shoe shaped mark on prefrontals and around eye. Body with 48–64 dark bands that are broad dorsally but narrow on the flanks; tail with 4–8 dark bands.

Size: Largest male, total length, 855 mm; tail 82mm.

Largest female, total length, 932 mm; tail 75 mm.

Dentition: Maxillary teeth II + 7 (sometimes II + 8, rarely

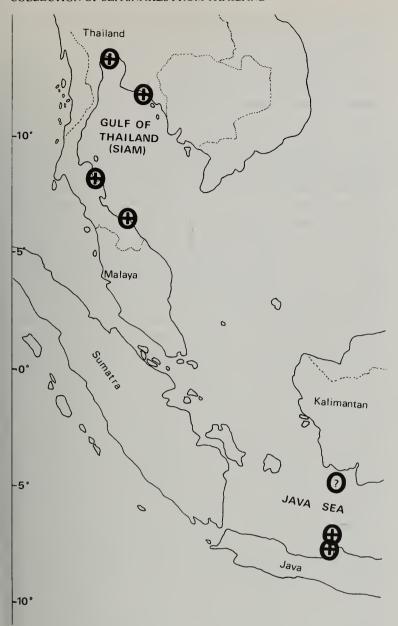


Fig. 1 Distribution of *Hydrophis belcheri*. + = Precise localities; ? = An imprecise locality 'Off S. of Kalimantan'; the holotype is alleged to have come from 'New Guinea', but this vague locality is regarded as dubious, no other examples appear to have been collected in the vicinity.

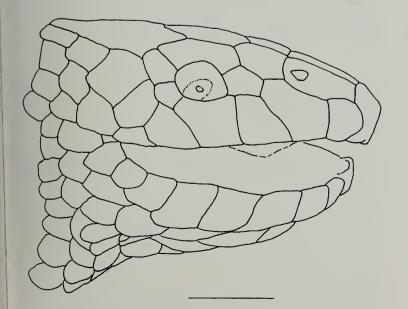


Fig. 2 Lateral view of the head of *Hydrophis belcheri* (BMNH 1987.48). Note only a single supralabial (the fourth) contacts the eye. (Scale = 5 mm).

II + 6 or II + 9); palatine teeth 7–9; pterygoid teeth 14–17; dentary teeth 17–19.

Additional features: Sphenoid entering broadly into the ventral margin of the cavum epiptericum. Snout falls two to three tail lengths short of the cloaca when body doubled at heart

Relationships: Assigned by McDowell (1972) to subgenus *Aturia*. Within this subgenus there appear to be two groups of species: *torquatus* et al. and *ornatus* et al., McDowell (1972: 226) regards *belcheri* as being 'intermediate between these two groups'.

DIAGNOSIS. H. belcheri may be diagnosed on the basis of the combination of features mentioned above. One of the most reliable characters is the possession of a single supralabial contacting the eye, Fig. 2, (apparently unique among Hydrophis sens. lat.). However some variation is noted here for the first time: One male (BMNH 1987.51) showed assymetry, on the right side of the head there is the characteristic condition of a single supralabial (the fourth) entering the eye while, on the left, two supralabials enter the eye (the third and fourth). The other exception is a female, BMNH 1987.42, which has two supralabials entering the eye on both sides. This female contained four young (BMNH 1987.43-46) three of which have apparently inherited the atypical condition of multiple supralabials entering the eye while the remaining specimen (BMNH 1987.46) has only the fourth doing so. McDowell (1972) assigned belcheri to subgenus Aturia which may be distinguished from subgenus Hydrophis by its lack of a triangular flange on the palatine and from subgenus Leioselasma by sphenoid entering broadly into the anterior oriface of the cavum epiptericum. Within the Aturia key presented by McDowell (1972: 228-229) belcheri is grouped with those species that have the heart just behind the anterior third of the body (i.e. with lapemoides, bituberculatus, ornatus, and inornatus).

Distinguished from *lapemoides* by the absence of cuneate scales on the lower lip and generally fewer maxillary teeth (usually 7 in *belcheri* vs. 8–11 in *lapemoides*). *H. ornatus* and *inornatus* similarly have more maxillary teeth (10–13). *H. bituberculatus* appears closest to *belcheri* but has strongly keeled scales (almost smooth in *belcheri*).

Hydrophis lapemoides (Gray, 1849) and Hydrophis sp.

H. lapemoides was long considered to be predominantly a Persian Gulf species, although ranging as far east as India and Sri Lanka (Smith, 1926; Minton, 1966; Ahmed, 1975). Recently however, lapemoides has also been collected in Malaysia: Penang (Toriba & Sawai, 1981) and the southern part of the Straits of Malacca (Rasmussen, 1987), and on west coast Thailand: Phuket Island (Rasmussen, 1987) and Krabi (BMNH 1987:1166, present collection). The status of specimens, identified as lapemoides, from the Philippines (Tamiya, Maeda & Cogger, 1983) was questioned by Rasmussen (1987) who had no authentic records of lapemoides east of the Straits of Malacca.

Therefore the occurrence of a problematic specimen, which appears closest to *lapemoides*, from the Gulf of Thailand (Samut Sakhon, BMNH 1987.172 present collection) is of some interest. Arne Rasmussen (in litt.) kindly compared the Samut Sakhon specimen with material of *lapemoides*, *lamberti*, *inornatus* and *ornatus*, and it appears that the specimen is closest to *H. lapemoides*.

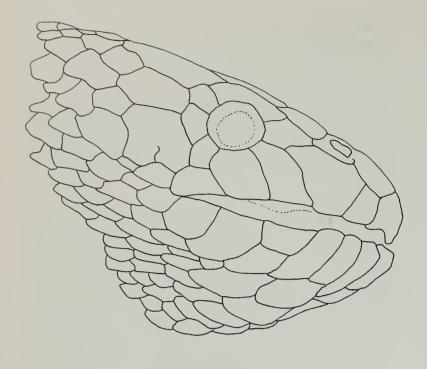


Fig. 3 Lateral view of the head of Hydrophis sp. (near lapemoides) BMNH 1987.172. (Scale = 5 mm).

This specimen will be more fully assessed in a future review of questionable 'lapemoides' specimens (Rasmussen, pers. comm.) in the mean time it is referred to as *Hydrophis* sp. (near *lapemoides*).

Hydrophis fasciatus (Schneider, 1799)

Hydrophis fasciatus is widespread from India to China and New Guinea. Two races are recognised, the region of Singapore seemingly marking the boundary between them; H. f. fasciatus occurring to the west of Singapore and H. f. atriceps to the east. The nominate form, according to Smith (1926), has more elevated scale counts (48-58 at midbody, 414-514 ventrals) compared with atriceps (39-49 at midbody, 323-453 ventrals). It appears that only H. f. atriceps has previously been collected in Thai waters and indeed, in the present collection, this was the commoner form. Twenty-five H. f. atriceps were obtained from localities bordering the Gulf of Thailand (BMNH 1987.143, 145, 147-149 Nakon Si Thammarat; BMNH 1987.150–154 Chumporn; BMNH 1987. 155-163, 165, 167-171 Tachalab near Chanthaburi). However, as Taylor (1965: 1047) observed, 'little collecting has been done on the coast of the Bay of Bengal and H. f. fasciatus may be found there'; this hypothesis has been confirmed by five specimens in the present collection from Kantang, near Trang, West Coast Thailand (BMNH 1987. 138–142), this seems to be the first record of the nominate form from Thailand.

DISCUSSION

As previously mentioned, perhaps the most notable aspect of the present collection is the presence of *Hydrophis belcheri*; a species not previously recorded from Thailand. Another surprising feature is the absence of some species that have previously been reported as common in Thai waters. Neither H. brookii nor H. torquatus were found, whereas Taylor (1965) reported both as being common in the Gulf of Thailand. Some reasons that might account for this anomaly could include the strictly local nature of the abundance in some forms, or perhaps seasonal fluctuations and migrations of some species. Evidence from the literature is unfortunately thin; there is some suggestion that sea snakes sometimes do seasonally fluctuate in numbers. Tu (1970), for instance, found that Enhydrina schistosa is most abundant in estuaries during the dry season (December to April); this is accounted for by the snakes migrating up river mouths during this period, when the tidal influx of sea water is at its greatest. Regrettably little is known regarding the factors affecting the distribution of H. brookii or H. torquatus. Taylor (1965: 1052) merely noted that H. brookii 'is common in the Gulf of Siam, especially so at Songkhla, where a series of 42 were taken, it is known also on the western side of Thailand on the coast of Trang Province'. Regarding H. torquatus subspp., Taylor (1965) noted that H. t. diadema 'is particularly abundant at the mouths of the Meklong and Chanthaburi rivers', whereas H. t. aagardi according to Smith (1920) occurs in 'deep clear sea water, as far as 20 miles from the coast', and Taylor's (1965) series was 'taken largely in the Sea of Singgora'.

In figures given by Tu (1974: 202) for collections in the Gulf of Thailand for the years 1967, 1969 and 1972 there are apparent fluctuations in the incidence of *H. torquatus diadema*, i.e. none were recognised among collections of 355 and 5311 sea snakes in 1967 and 1969 respectively, but 250 were in a collection of 6970 sea snakes in 1972. However, one factor making this difficult to evaluate is the significant number of 'unidentified' specimens (50 in 1967, 165 in 1969), Tu indicates that some *H. torquatus diadema* were 'probably included in the unidentified category' in 1967 and 1969. Similarly, *H. brookii* was not recorded during the 1967, 1969 or 1972 investigations, but was subsequently found among unidentified material, so that too was almost certainly underestimated.

While intriguing, there are a great many possibilities to account for the absence of apparently common species in the present collection, and without more information regarding conditions forming the background to success or failure of capture it is difficult to address the problem.

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APPENDIX

Material in present collection (listed by location)

Locality	Identification	Numbers
Gulf of Thailand		
Sai Buri	Aipysurus eydouxii Hydrophis cyanocinctus Lapemis hardwickii Praescutata viperina	1 1 13 5
Tachalab, nr. Chanthaburi	Aipysurus eydouxii Hydrophis belcheri H. caerulescens H. cyanocinctus H. fasciatus atriceps H. klossi H. ornatus Lapemis hardwickii	4 8 8 35 14 4 1 30
Samut Sakhon	Hydrophis belcheri H. cyanocinctus H. lamberti H. ornatus H. sp. (nr. lapemoides) Lapemis hardwickii	4 10 4 3 1 1
Pattani	Hydrophis belcheri	1
Nakhon Si Thammarat	Hydrophis belcheri H. caerulescens H. cyanocinctus H. fasciatus atriceps H. ornatus Lapemis hardwickii	1 2 20 5 1 11
Chumphon	Hydrophis cyanocinctus H. fasciatus atriceps Lapemis hardwickii	5 5 54
Wang Gaew	Pelamis platurus	1
Chon Buri	Pelamis platurus	1
West Coast		
Satun	Enhydrina schistosa	1
Kantang, nr. Trang	Hydrophis cyanocinctus H. f. fasciatus H. klossi H. spiralis Lapemis hardwickii	5 5 1 4 8
Phuket Island	Hydrophis ornatus Lapemis hardwickii	1 15
Krabi	Hydrophis cyanocinctus H. lapemoides	2